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PROGRESS IN FOREST INSECT CONTROL, WITH SPECIAL REFERENCE TO THE TUSSOCK MOTH CAMPAIGN

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PROGRESS IN FOREST INSECT CONTROL, WITH SPECIAL REFERENCE TO THE TUSSOCK MOTH CAMPAIGN

By

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To be delivered at the annual meeting of the Western Forestry and Conservation Association to be held in Portland, December 11 and 12, 1947.

A satisfactory control of forest insects is an essential but difficult part of forest land management. It influences silvicultural practices and adds to the cost of growing trees. It is one of the "hard ways" of forestry. But unless destructive insects are controlled, many well-laid plans of forestry will fail. This requirement is recognized in forest-management plants, in research programs, and in over-all forest policies. If in some instances, and by some agencies, this condition is not recognized, it will be soon.

Recent developments in direct methods of forest-insect control have not been outstanding. To control the mountain pine beetle we have a spray that will penetrate the bark of infested trees and kill the insect broods beneath. This method eliminates the use of fire, and permits control operations to be conducted at all seasons of the year. Tests have been made with small power sprayers in applying this spray to standing infested trees. A properly powered pump mounted on a weapons carrier or other conveyance should be satisfactory in most lodgepole pine stands.

In the administration of control measures progress has been made by contracting with local woodsmen for the treatment of infested trees. Although these "gypo" bids are low, owing to increased supervision, etc., there is not much saving of project funds. However, under existing labor conditions, many more trees are treated.

Tests of aerial spraying with DDT were conducted in 1947 in an attempt to prevent bark beetle attacks. Although heavy dosages were used and fairly large areas covered, these tests were not successful. Failure came from our inability to obtain an adequate coverage of DDT on the boles of standing trees. This failure does not indicate that aerial control of bark beetles is not possible. With new equipment and even better insecticides we may be able to overcome past failures.

Control of insects feeding upon the foliage of forest trees has long been an almost insurmountable problem, owing to the difficulty of spraying large forest areas from the ground. Now, with the airplane and such new insecticides as DDT, this task no longer appears so hopeless. However, they do not offer a cure-all for forest-defoliator problems. The effectiveness of all insecticides varies against different insects, and against different developmental stages of the same insect species. Against some insects DDT is totally ineffective.

My assignment on the program of this meeting carried the request that special consideration be given to the somewhat spectacular tussock moth control operation in northern Idaho. As this story is long, I shall bring you highlights only, but if time permits I will try and answer all questions.

The Douglas-fir tussock moth is presumably a native of the northwestern United States and adjacent areas in Canada. The first outbreak of which we have record was at Chase, B. C., in 1918. In 1927 an outbreak was recorded in Nevada. In 1928 outbreaks occurred in central Idaho. In 1930, on several square miles of the Colville National Forest in eastern Washington, 300,000 million board feet of commercial Douglas-fir were destroyed. Again in 1935 there were several areas of severe infestation near Sun Valley, Idaho.

The northern Idaho outbreak started in 1944 with a few spots of infestation. For the most part these scattered spots consisted of shade trees around farm houses. It was not until the fall of 1945 that sizable areas were reported. These reports listed 320 acres at Viola, Idaho, and 80 acres near Fairfield, Washington, and it was only in these two areas that the infestation was sufficiently severe to attract attention. Early in June 1946 these infested areas were found to be far larger than had been previously reported. In July, as thousands of acres of mountain sides turned brown from the injured foliage, public interest was aroused. A mass meeting of all interested agencies was held to determine the course of action to be taken. At this meeting it was decided to look into the possibilities of artificial control for the 1947 season. The task of determining the size of the infested area, and the potential severity of the infestation in 1947, was assumed by the Bureau of Entomology and Plant Quarantine's laboratory at Coeur d'Alene.

An aerial reconnaissance in the fall of 1946 placed the infested area at 350,000 acres. Subsequent ground surveys supported this estimate. Studies were then started to find out, if possible, what the status of the infestation would be in 1947. These studies considered the possible effects of parasitism. Although there was some natural control a large percentage of the caterpillars reached maturity. Adult moths appeared and many egg masses followed. These eggs overwintered and hatched in late May and early June of 1947.

Later in the season a quantitative comparison was made of the 1945 and 1946 egg masses. These data proved to be a good criterion of the potential tussock moth population which could be expected in 1947. The 1946 egg masses were 450 percent greater than the number produced in 1945. This indicated a heavy 1947 caterpillar population unless something unforeseen happened to the eggs during the 1946-47 winter. To detect such a possibility, egg masses were collected every two weeks during the winter, and held at room temperatures to facilitate hatching. These hatchings showed that in May there was an average of 65 caterpillars per egg mass which assured an infestation of sufficiently severity to warrant the start of control.

With the potentials of the 1947 infestation established, control measures developed jointly by the Forest Service and the Bureau of Entomology and Plant Quarantine were recommended and approved. Aerial spraying offered the only possibility, and for the tussock moth this possibility had been unexplored. In bringing this project into reality there were problems to be solved concerning airfields, surveys to determine the areas to be treated, questions of land ownership, programs for public education, flying contracts, and of course 175 tons of DDT, which we were told were not available. However, in some way all these requirements were met, and the operation was started as planned.

There was of course the question of funds. The actual cost of treatment had been estimated at $1.70 per acre. A formula for payments on different land ownerships was approved by which the United States would pay for control on all Federal lands, the State of Idaho would pay for all State and county lands, and the cost of control on privately owned lands would be shared as follows--50 percent by the United States Government, 25 percent by the State of Idaho, and 25 percent by the owner of the land.

The Potlatch Timber Protective Association was the first agency to make its money available. Its share was $88,000. The State of Idaho followed with an appropriation of $210,000, and on the first of May the United States Congress passed an emergency appropriation of $395,000. As the use of private and State funds was contingent upon the Federal appropriation, no funds were available for the preparatory phases of the project until May. This could have been serious. However, the emergency was met with contributed services from the Federal and State Governments.

A spraying contract was awarded to Central Aircraft of Yakima, Washington, and the Johnson Flying Service of Missoula, Montana, who pooled their equipment and submitted one bid. Central Aircraft used small planes of the Stearman and Stinson types, carrying from 80 to 200 gallons of spray. The Johnson Flying Service used one Douglas C-47 carrying 1000 gallons and two Ford tri-motors, which carried 400 gallons each. Small planes worked at elevations of 50 to 100 feet above the trees, while the larger ships flew at 100 to 150 feet. The swath width ranged from 100 feet for the small planes to 400 feet for the C-47. As this was the first time that these large planes had been used for forest spraying in the United States, their performance was watched with interest.

Contracts for a formulated spray were awarded the Michigan Chemical Company at St. Louis, Michigan, and the Stefan Chemical Company at Chicago. This spray was delivered at Moscow, Idaho, in tank cars. A total of 390,000 gallons, or 39 tank cars, of spray were used. Army gasoline tankers of 2,000- and 4,000-gallon capacity were used in transporting the spray from railhead to airfield. The larger planes flew almost entirely from the Moscow-Pullman airfield, while the small ships flew from temporary strips constructed in different portions of the area.

The spray consisted of 1 pound of DDT in an auxiliary solvent, to which was added sufficient fuel oil to make 1 gallon. This solution was applied at the rate of 1 gallon per acre. The possibility of detrimental effects associated with its use was studied by officers of the United States Fish and Wildlife Service, who reported no damage to wild animals, game fish, or birds, although some suckers and crayfish were killed. We received no authenticated complaints from farmers concerning injuries to domestic stock or to bees. Beehives were removed from areas sprayed, and those in adjacent areas were covered during the spraying period.

Spraying was begun on May 22. As expected, there were many "bugs", in addition to the tussock moth, associated with the start of the operation. However, they were eliminated quickly, and the project moved smoothly to its conclusion on July 2. Although the work was completed as planned, considerable time was lost from nonflying weather and temporary shortages of spray material. Control was directed against the small caterpillars, to prevent 1947 defoliation, and to preserve as great a percentage of the parasitic and predaceous insect populations as possible.

The results were far better than had been anticipated. We had hoped to prevent further serious defoliation by reducing the caterpillar population by at least 75 percent. Although we know that not all the caterpillars were killed, the actual reduction was very nearly 100 percent. Small caterpillars were susceptible to DDT, but as they reached maturity they became more resistant.

Although costs were estimated at $1.70 per acre, the final figure will be approximately $1.50. This will include pre-control activities and technical studies. Original allotments were for the treatment of 350,000 acres. Our pre-control survey showed an area of 395,535 acres in Idaho which was treated. We were also able to cooperate with the State forester of Washington and the U. S. Forest Service in Region 6, in the treatment of 4,375 acres in Washington and 13,559 acres on the Umatilla National Forest in Oregon. These additional areas increased the original acreage by 18 percent, and there is still a balance of funds.

A word as to the benefits gained from this project. Within the original infested area there were 1,518,856,000 board-feet of merchantable fir timber, valued at $4,328,000. Within adjacent areas, which could have become infested by the continuation of this outbreak, there was an additional volume of 1,182,000,000 board-feet. As a result of the defoliation in 1946, which was the first year of severe injury, there was a complete kill of all trees on about 16,000 acres. It has been estimated that the 1947 defoliation would have increased this acreage to 156,000 acres. This does not include the acreage of partial kills.

No further control work will be necessary. Following the cessation of control, an area of 25,000 acres of medium 1947 defoliation near Orofino, Idaho, was recorded. Although there were a few insects in this area in 1946, the damage was so light as to escape detection by our survey crew. Throughout this area this year's caterpillar population became full grown and many of them pupated. However, such a large percentage were destroyed by natural forces that the 1948 infestation will not warrant control.

Although the United States Department of Agriculture was charged with the responsibility of this project, without the cooperation of all agencies it would have failed. If this operation is a mark of progress in forest-insect control, then I am sure that it shows also what can be done in forestry with the full cooperation of private timber owners and State and Federal Governments. Much credit is due the Potlatch Timber Protective Association for their active participation supported by their financial contribution. The State of Idaho made the project possible by passing necessary legislation, and by allotting funds. The State forester of Idaho and his staff cooperated in every possible way, besides contributing a major service in determining land ownerships and collecting private funds. The United States Weather Bureau provided a complete weather-forecasting station, which proved invaluable to the success of the operation. The Forest Service carried the responsibility for the physical administration of the project, while the Bureau of Entomology and Plant Quarantine was charged with all technical phases.

We were fortunate in having spraying contractors who were greatly interested in making the project a success. Their pilots were fine, well-trained young men, who made every effort to do a good job of spraying--and they succeeded. We had one flying accident. A small plane was caught in an early morning down draft from which there was no escape. The pilot made an emergency "walk away" landing. Obviously we were all happy over the outcome of this operation. The results were all that could be asked for, the work was finished on schedule, and there were no serious accidents. It was a privilege and a pleasure to have a small part in northern Idaho's tussock moth campaign.